ATTACHMENT 3

EMISSION CALCULATIONS

ATTACHMENT 3
EMISSION CALCULATIONS

Pre-control and controlled emissions are calculated below. These calculations are based on the following parameters:

Pulverized fuel (PF) to the CCC:	4.954 ton/hr (4,494 kg/hr)
Exhaust gas moisture content:	11.4% (volume)
Exhaust gas temperature:	160 °C (320 °F)
Boiler exhaust gas flow (wet):	44,764 Nm^3/hr
Boiler exhaust gas flow (dry):	39,661 Nm^3/hr
Operating hours:	24 hr/day; 320 day/yr; 7,680 hr/yr

PRE-CONTROL EMISSIONS

Pre-control emissions of criteria pollutants, metals, and acid gases are calculated below, using the emission factors in the table below.

Pollutant	Emission Factor, mg/Nm^3 (dry)[a]	Lb/hr	Ton/yr
NO_x	100	8.74	33.6
SO_2	477	41.71	160.2
SO_3	9.7	0.85	3.3
HCl	162	14.16	54.4
HF	9.2	0.80	3.1
CO	40	3.5	13.4
VOC	20	1.75	6.7
PM	2,000	174.88	671.5
Hg	0.175	0.015	0.058
CO_2	0.166 kg/Nm^3 (wet)	16,382	62,907

* Emission factors are taken from the Basic Engineering Report dated November 15, 2012, prepared by Jasper GmbH of Quickborn, Germany.

DTE has conducted several laboratory analyses of the feedstock after it was converted into the PF product. This information was obtained while DTE operated a pilot scale RRS reactor at the Atlantic County Utilities Authority for a 180-day period in the first half of 2012. In this pilot scale program, DTE utilized MSW and sludge from the City of Allentown and created PF product on a small scale. Samples of the PF were analyzed in laboratories to determine chemical composition, heat content and ash percentage. In addition to the City of Allentown, DTE also collect samples of MSW and sludge from several other municipalities. In total, DTE conducted

16 tests over a 180-day period. The laboratory results indicated that a fairly consistent product was produced over the entire test period. Test results are shown in the following table.

Allentown Pulverized Fuel Mix Laboratory Analysis

		Sample 1	Sample 2	Sample 3
Aluminum	mg/kg	1890	764	5200
Antimony	mg/kg	---	10.3	2.17
Arsenic	mg/kg	ND	10	4.14
Beryllium	mg/kg	---	ND	0.225
Calcium	mg/kg	24600	16200	19000
Cadmium	mg/kg	0.304	ND	3.67
Chromium	mg/kg	15.3	64.9	13.9
Copper	mg/kg	268	141	591
Iron	mg/kg	2280	---	---
Potassium	mg/kg	938	2790	1970
Magnesium	mg/kg	1030	2630	3950
Manganese	mg/kg	83.9	221	120
Molybdenum	mg/kg	---	9.52	6.54
Sodium	mg/kg	638	638	785
Selenium	mg/kg	---	ND	2.57
Thallium	mg/kg	---	21.2	ND
Nickel	mg/kg	8.92	97.2	13.2
Lead	mg/kg	15.5	ND	32.4
Zinc	mg/kg	304	420	884

Based on a sample analysis of the pulverized fuel, the metals contained in the pulverized fuel burned in the CCC are as follows.

Pollutant	Analysis, mg/kg (as-is)	Lb/hr*	Ton/yr	
Antimony	10.3	0.10	0.38	0.43
Arsenic	10.0	0.10	0.38	
Beryllium	0.225	0.0022	0.008	0.009
Cadmium	3.67	0.036	0.14	0.15
Chromium (total)	64.9	0.64	2.5	
Manganese	221	2.19	8.41	
Selenium	2.57	0.025	0.10	
Lead	32.4	0.32	1.23	
Nickel	97.2	0.96	3.69	

* Based on 4.954 tons/hr of Pulverized Fuel (or 4,494.2 kg/hr.)

A large percentage of the metals in the pulverized fuel is retained in the bottom ash following combustion, with a much smaller fraction being entrained in the boiler exhaust gases and ducted to the emission control system. The following ash retention factors are taken from a paper entitled, "The Behavior of Metals in Cement Kilns," presented by Dr. Michael Von Seebach and J. Bruce Tompkins at the 26th International Cement Seminar in December 1990.

Metal	Retained in Ash, %	Metals in Boiler Exhaust Gas (to emission control system)	
		lb/hr	ton/yr
Antimony	99.769	0.00023	0.00088
Arsenic	99.8868	0.00011	0.00043
Beryllium	99.8681	2.90×10^{-6}	1.06×10^{-5}
Cadmium	99.555	0.00016	0.00062
Chromium (total)	99.8553	0.00093	3.62×10^{-5}
Manganese	95.4002[a]	0.101	0.391
Selenium	95.4002	0.0011	0.0046
Lead	99.8531	0.00047	0.0018
Nickel	99.9574	0.00041	0.0016

a No retention factor was reported for manganese; the lowest reported retention factor for any metal (95.4002%) was conservatively used.

Start-up Emissions

The burner used during start-up is rated at 1.079 MMBTU/hr, which represents a natural gas firing rate of 1,079 scfh. Start-up operations are expected to occur three times a year, for 8 hours each time (total of 24 hr/yr). Emissions from natural gas combustion during start-up are calculated below, using AP-42 emission factors.

NO_x: 100 lb/MMcf x 1,079 scfh = 0.11 lb/hr (0.001 ton/yr)

CO: 84 lb/MMcf x 1,079 scfh = 0.09 lb/hr (0.001 ton/yr)

SO_x: 0.6 lb/MMcf x 1,079 scfh = 0.001 lb/hr (0.00001 ton/yr)

PM: 7.6 lb/MMcf x 1,079 scfh = 0.008 lb/hr (0.0001 ton/yr)

VOC: 5.5 lb/MMcf x 1,079 scfh = 0.006 lb/hr (0.0001 ton/yr)

The contribution of the burner emission is de minimis.

CONTROLLED EMISSIONS

Using the removal efficiencies of the control devices provided by Ducon, the controlled emissions in the stack gases are presented in the following table.

Pollutant	Control Efficiency, %	Controlled Emissions	
		Lb/hr	Ton/yr
NO_x	85.1	1.30	5.0
SO_2	97.5	1.04	4.0
SO_3	---	0.85	3.3
HCl	99.1	0.13	0.50
HF	85	0.12	0.46
CO	---	3.5	13.4
VOC	40.6	1.04	4.0
PM	99.8	0.39	1.5
Hg	90	0.0015	0.006
CO_2	---	16,382	62,907

Controlled metal emissions are calculated below by applying a baghouse control efficiency of 99.8 percent to the uncontrolled emissions.

Metal	Controlled Emissions	
	Lb/hr	Ton/yr
Antimony	4.6×10^{-7}	1.77×10^{-6}
Arsenic	2.2×10^{-7}	8.45×10^{-7}
Beryllium	5.8×10^{-9}	2.23×10^{-8}
Cadmium	3.2×10^{-7}	1.23×10^{-6}
Chromium (total)	1.86×10^{-6}	7.14×10^{-6}
Manganese	2.0×10^{-4}	8.0×10^{-4}
Selenium	2.2×10^{-6}	8.44×10^{-6}
Lead	9.4×10^{-7}	3.6×10^{-6}
Nickel	8.2×10^{-7}	3.15×10^{-6}

Emission Concentrations

Department regulations establish limits on PM and SO_x (SO_2 + SO_3) emissions, expressed in lb/MMBTU of heat input. The following calculations demonstrate that the regulatory limits will be met.

PM: 0.39 lb/hr ÷ 76.28 MMBTU/hr = 0.0051 lb/MMBTU, which meets the regulatory limit of 0.4 lb/MMBTU

SO_x: (1.04 + 0.85) lb/hr ÷ 76.28 MMBTU/hr = 0.025 lb/MMBTU, which meets the regulatory limit of 3 lb/MMBTU

ATTACHMENT 4

REGULATORY APPLICABILITY ANALYSIS

ATTACHMENT 4
REGULATORY APPLICABILITY ANALYSIS

DTE is required to comply with regulations promulgated by the U.S. Environmental Protection Agency (EPA) and the Pennsylvania Department of Environmental Protection (Department) with respect to emissions of air contaminants. This attachment evaluates the applicability of federal and state air quality regulations to the installation of the proposed energy production facility.

U.S. ENVIRONMENTAL PROTECTION AGENCY REGULATIONS

EPA currently regulates new and modified sources of air contaminants through four programs:

1) New Source Performance Standards (NSPS)
2) National Emission Standards for Hazardous Air Pollutants (NESHAP)
3) Maximum Achievable Control Technology (MACT) for Source Categories
4) Prevention of Significant Deterioration (PSD)/Nonattainment New Source Review (NSR)

New Source Performance Standards

The NSPS regulations currently apply to numerous categories of sources. These standards list emission limitations and operating requirements specific to each source category. The following standards, codified at 40 CFR Part 60, have potential applicability to the proposed facility. Each rule is evaluated below and a conclusion is drawn related to applicability or non-applicability.

Subpart C-b, Emissions Guidelines and Compliance Times for Large Municipal Waste Combustors that are Constructed on or Before September 20, 1994 -- This rule applies to municipal solid waste (MSW) combustors with the capacity to burn more than 250 tons per day (tpd) of MSW, and for which construction was commenced before September 20, 1994. The proposed facility has a rated throughput of 120 tpd of MSW and 47 tpd of sewage sludge, for a total of 167 tpd. Therefore, it does not meet the construction date or the throughput criteria. It should be noted that "refuse-derived fuel" (RDF) is defined in the rule as "...a type of MSW produced by shredding and size classification." Although DTE will be shredding and sorting the MSW it receives, it will not be size classified; shredding and sorting are both done to improve processing times in the batch process in the RRS. The shredded MSW will be mixed with sewage sludge and fed into the RRS units to be used as feedstock to produce a new clean pulverized fuel (PF) to be burned in the CCC unit. Therefore, while the facility will process MSW and sewage sludge, it will not burn either material; DTE will be producing and burning a completely new, sterilized, homogeneous, pulverized, de-watered fuel made from these materials and with a higher heating value than the delivered feedstock. This pulverized fuel is neither MSW nor RDF, and after being processed in the RRS units, it is no longer a waste. In fact, it has monetary value and can be sold to third parties for use as a fuel. The Pennsylvania Utility Commission (PUC) has determined that DTE's pulverized fuel meets the required standards under its Alternative Energy Portfolio Standards (AEPS) and is classified as a Tier I fuel.

As defined above, PF is created from treated feedstock in a unique process called Hydrothermal Decomposition using high pressure and high temperature steam to break down the components of the feedstock at the molecular level to produce sterilized, homogeneous renewable clean pulverized fuel with a higher heating value.

For the reasons cited above, this rule does not apply.

Subpart D, Standards of Performance for Fossil-Fuel-Fired Steam Generators -- This rule applies to fossil fuel- and wood residue-fired steam generating units with rated heat input of more than 250 MMBTU/hr. The Complete Combustion Chamber (CCC) will have a rated heat input of approximately 76.28 MMBTU/hr, and will not burn fossil fuel or wood residue, except for the natural gas-fired start-up burner, which has a rated heat input of 1.1 MMBTU/hr. Therefore, the facility does not include a fossil-fuel-fired steam generating unit and this rule does not apply.

Subpart D-a, Standards of Performance for Electric Utility Steam Generating Units -- This rule applies to electric utility steam-generating units, defined as "any steam electric generating unit capable of burning more than 250 MMBTU/hr of fossil fuel (natural gas, petroleum, coal, and any form of solid, liquid, or gaseous fuel derived from such material for the purpose of creating useful heat) that is constructed for the purpose of supplying more than one-third of its potential electric output capacity and more than 25 MW net-electrical output to any utility power distribution system for sale." The CCC at the DTE facility will have a rated heat input of 76.28 MMBTU/hr, and the net electrical output will be on the order of 1 to 2 MW. Accordingly, the facility does not exceed the regulatory thresholds for heat input or net-electrical output, and this rule does not apply.

Subpart D-b, Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units -- This rule applies to steam generating units that burn any fuel, by-product or waste, and have heat input capacities between 100 and 250 MMBTU hr from fuels burned in the steam generating unit. The CCC at the proposed facility will have a rated heat input capacity of 76.28 MMBTU/hr. The fuel burned in the CCC unit is not a by-product or a waste. Moreover, fuel is not burned in the steam-generating unit. Therefore, this rule does not apply.

Subpart D-c, Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units -- This rule applies to steam generating units that have heat input capacities between 10 and 100 MMBTU hr. A "steam generating unit" is defined as "a device that combusts any fuel and produces steam or heats water or heats any heat transfer medium. This term includes any duct burner that combusts fuel and is part of a combined cycle system. This term does not include process heaters as defined in this subpart." At the DTE facility, the fuel is burned in the CCC but the steam is produced in the waste heat boiler. Thus, there is no single device in which the both the fuel combustion and the steam generation take place. Accordingly, this rule does not apply.

Subpart E, Standards of Performance for Incinerators -- This rule applies to incinerators with a charging rate greater than 50 tpd. "Incinerator" is defined as "any furnace used in the process of burning solid waste for the purpose of reducing the volume of the waste by removing

combustible matter." "Solid waste" is defined as "refuse, more than 50 percent of which is municipal type waste consisting of a mixture of paper, wood, yard wastes, food wastes, plastics, leather, rubber, and other combustibles, and noncombustible materials such as glass and rock." While the CCC has a charging rate above 50 tpd, it does not burn a solid waste, as defined in the rule. It burns a homogeneous pulverized, de-watered fuel produced from feedstock. Therefore, this rule does not apply.

Subpart E-b, Standards of Performance for Large Municipal Waste Combustors for Which Construction is Commenced After September 20, 1994 or for Which Modification or Reconstruction is Commenced After June 19, 1996 -- This rule applies to each municipal waste combustor unit with a combustion capacity greater than 250 tons per day of municipal solid waste for which construction, modification, or reconstruction is commenced after September 20, 1994. The proposed DTE facility will not burn MSW; it will burn a processed (pulverized and dried) fuel prepared from MSW and sewage sludge feedstock. The rule defines RDF as a type of MSW that has undergone shredding and size classification. The waste at the DTE facility will not undergo size classification. Moreover, the facility will not have the capacity to burn more than 250 tpd. Therefore, since the processed fuel is neither MSW nor RDF, this rule does not apply.

Subpart O, Standards of Performance for Sewage Treatment Plants -- This rule applies to each incinerator that combusts wastes containing more than 10 percent sewage sludge (dry basis) produced by municipal sewage treatment plants, or each incinerator that charges more than 1,000 kg (2,205 lb) per day municipal sewage sludge (dry basis). The DTE facility will not be burning sewage sludge, but rather a fuel produced from MSW and sewage sludge. This fuel is not considered a waste. Therefore, this rule does not apply.

Subpart GG, Standards of Performance for Stationary Gas Turbines -- This rule applies to stationary gas turbines with a heat input at peak load equal to or greater than 10 MMBTU/hr, based on the lower heating value of the fuel fired. The rule defines the following terms:

> "Stationary gas turbine" means "any simple cycle gas turbine, regenerative cycle gas turbine or any gas turbine portion of a combined cycle steam/electric generating system that is not self propelled."
>
> "Simple cycle gas turbine" means any stationary gas turbine which does not recover heat from the gas turbine exhaust gases to preheat the inlet combustion air to the gas turbine, or which does not recover heat from the gas turbine exhaust gases to heat water or generate steam."
>
> "Regenerative cycle gas turbine" means "any stationary gas turbine which recovers heat from the gas turbine exhaust gases to preheat the inlet combustion air to the gas turbine."
>
> "Combined cycle gas turbine" means "any stationary gas turbine which recovers heat from the gas turbine exhaust gases to heat water or generate steam."

The turbine at the DTE facility is a steam turbine, not a gas turbine. Therefore, this rule does not apply.

Subpart AAAA, Standards of Performance for Small Municipal Waste Combustion Units for Which Construction is Commenced after August 30, 1999, or for which Modification or Reconstruction is Commenced after June 6, 2001 -- This rule applies to municipal solid waste combustion units constructed after August 30, 1999, and having the capacity to combust at least 35 tons per day but no more than 250 tons per day of municipal solid waste (MSW) or refuse-derived fuel (RDF). The proposed DTE facility will not burn MSW; it will burn a processed (pulverized and de-watered) fuel prepared from MSW and sewage sludge feedstock by a batch Hydrothermal Decomposition process through the injection of high pressure and high temperature steam into a specialized piece of equipment identified as the RRS chamber. This unique process does not meet the definition of refuse-derived fuel (RDF) produced through size classification in this regulation. The waste at the DTE facility will not undergo size classification. Therefore, since the processed fuel is neither MSW nor RDF, this rule does not apply.

Subpart CCCC, Standards of Performance for Commercial and Industrial Solid Waste Incineration Units -- This rule applies to Commercial and Industrial Solid Waste Incineration (CISWI) units, defined as "any distinct operating unit of any commercial or industrial facility that combusts, or has combusted in the preceding 6 months, any "solid waste," which is defined as "any garbage, or refuse, sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities, but does not include solid or dissolved materials in domestic sewage, or solid or dissolved materials in irrigation return flows or industrial discharges that are point sources subject to permit under 33 U.S.C. 1342, or source, special nuclear, or by-product material as defined by the Atomic Energy Act of 1954, as amended (68 Stat. 923)." Since DTE will be burning a produced fuel (not a waste), this rule does not apply.

The rule exempts small power production facilities DTE understands that this plant is classified as a small power production facility.

Subpart EEEE, Standards of Performance for Other Solid Waste Incineration Units for Which Construction is Commenced After December 9, 2004, or for Which Modification or Reconstruction is Commenced on or After June 16, 2006 -- This rule applies to Other Solid Waste Incineration (OSWI) units and includes the following definitions:

> "Other Solid Waste Incineration Units" means either a very small municipal waste combustion unit or an institutional waste incineration unit.
>
> "Very small municipal waste combustion unit" means any municipal waste combustion unit that has the capacity to combust less than 35 tons per day of municipal solid waste or refuse-derived fuel.

> "Institutional waste incineration unit" means any combustion unit that combusts institutional waste and is a distinct operating unit of the institutional facility that generated the waste.

The DTE facility will burn more than 35 tpd of produced fuel (not MSW or refuse-derived fuel) and is not part of a facility where waste is generated. Therefore, it does not satisfy the regulatory definitions and the rule does not apply.

Subpart KKKK, Standards of Performance for Stationary Combustion Turbines -- This rule applies to stationary combustion turbines with a heat input at peak load equal to or greater than 10 MMBTU/hr, based on the higher heating value of the fuel. Only heat input to the combustion turbine should be included when determining whether or not this subpart is applicable to a turbine. Any additional heat input to associated heat recovery steam generators (HRSG) or duct burners should not be included when determining peak heat input. However, this subpart does apply to emissions from any associated HRSG and duct burners. The DTE turbine is a steam turbine, not a stationary combustion turbine. It does not have direct heat input; all heat is provided to the CCC. Therefore, this rule does not apply.

Subpart LLLL, Standards of Performance for New Sewage Sludge Incineration Units -- This rule applies to sewage sludge incineration units, defined as "incineration units combusting sewage sludge for the purpose of reducing the volume of the sewage sludge by removing combustible matter. Sewage sludge incineration unit designs include fluidized bed and multiple hearth. An SSI unit also includes, but is not limited to, the sewage sludge feed system, auxiliary fuel feed system, grate system, flue gas system, waste heat recovery equipment, if any, and bottom ash system. The SSI unit includes all ash handling systems connected to the bottom ash handling system. The combustion unit bottom ash system ends at the truck loading station or similar equipment that transfers the ash to final disposal. The DTE facility will not burn sewage sludge, but rather pulverized, de-watered fuel produced from MSW and sewage sludge feedstock. Therefore, this rule does not apply.

National Emission Standards for Hazardous Air Pollutants

The NESHAP regulations apply to the following compounds listed as hazardous air pollutants (HAPs) prior to the passage of the Clean Air Act Amendments of 1990 (CAAA): asbestos, benzene, beryllium, coke oven emissions, inorganic arsenic, mercury, radionuclides, and vinyl chloride. The regulation lists emission limits and operating parameters that must be followed for specifically listed sources that emit these compounds. The following standards, codified at 40 CFR Part 61, have potential applicability to the proposed facility. Each rule is evaluated below and a conclusion is drawn related to applicability or non-applicability.

Subpart C, National Emission Standard for Beryllium -- This rule applies to the following process categories: extraction plants, ceramic plants, foundries, incinerators, and propellant plants which process beryllium ore, beryllium, beryllium oxide, beryllium alloys, or beryllium-containing waste. The following terms are defined in the rule:

> "Beryllium-containing waste" means material contaminated with beryllium and/or beryllium compounds used or generated during any process or operation performed by a source subject to this subpart.
>
> "Incinerator" means any furnace used in the process of burning waste for the primary purpose of reducing the volume of the waste by removing combustible matter.

Trace amounts of beryllium may be present in the feedstock streams received at the DTE facility; however, DTE will not be processing "beryllium-containing waste" from any of the source operations identified in the applicability section. Therefore, this rule does not apply.

Subpart E, National Emission Standard for Mercury -- This rule applies to several process categories including the incineration or drying of wastewater treatment plant sludge. Relevant definitions from this rule are as follows:

> "Sludge" means sludge produced by a treatment plant that processes municipal or industrial waste waters.
>
> "Sludge dryer" means a device used to reduce the moisture content of sludge by heating to temperatures above 65 °C (150 °F) directly with combustion gases.

The DTE facility will dry a produced fuel, the majority of which is shredded MSW to which sewage sludge has been added. It will not dry wastewater treatment plant sludge. Therefore, this rule does not apply.

Maximum Achievable Control Technology Standards

MACT standards have been promulgated for numerous categories of major HAP sources (those with potential emissions of 10 or more tons per year of any individual HAP or 25 tons per year of combined HAPs). Recently, EPA has promulgated a number of Generally Achievable Control Technology (GACT) standards applicable to area (minor) HAP sources. The MACT and GACT standards typically impose emission limitations and operating requirements specific to each source type. The following standards, codified at 40 CFR Part 63, have potential applicability to the proposed facility. Each rule is evaluated below and a conclusion is drawn related to applicability or non-applicability.

Subpart DD, National Emission Standards for Hazardous Air Pollutants from Off-Site Waste and Recovery Operations -- This rule applies to major HAP-emitting facilities that receive off-site materials from specified waste sources. The rule specifically excludes household waste (a component of MSW) from the list of specified waste sources. Since the DTE facility will not be a major HAP-emitting facility and principally DTE is utilizing feedstock from household waste, this rule does not apply.

Subpart EEE, National Emission Standards for Hazardous Air Pollutants from Hazardous Waste Combustors -- This rule applies to incinerators, kilns, furnaces, boilers, and other devices that

combust hazardous waste; it applies to both major and area HAP sources. Since the DTE facility will not be processing hazardous waste, this rule does not apply.

Subpart YYYY, National Emission Standards for Hazardous Air Pollutants for Stationary Combustion Turbines -- This rule applies to stationary combustion turbines at major HAP-emitting facilities. Since the DTE facility will not be a major HAP source and the DTE turbine is not a stationary combustion turbine, this rule does not apply.

Subpart DDDDD, National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters -- This rule applies to boilers and process heaters (that use indirect heat transfer) located at major HAP facilities. Since the DTE facility will not be a major HAP source, this rule does not apply.

Subpart JJJJJJ, National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources -- This rule applies to boilers located at area HAP sources. It defines a boiler as "... an enclosed device using controlled flame combustion in which water is heated to recover thermal energy in the form of steam and/or hot water. Controlled flame combustion refers to a steady-state, or near steady-state, process wherein fuel and/or oxidizer feed rates are controlled. A device combusting solid waste, as defined in §241.3 of this chapter, is not a boiler unless the device is exempt from the definition of a solid waste incineration unit as provided in Section 129(g)(1) of the Clean Air Act. Waste heat boilers, process heaters, and autoclaves are excluded from the definition of Boiler." At the DTE facility, the pulverized fuel will be burned in the CCC, but the steam will be generated in the waste heat boiler, which is specifically exempt from Subpart JJJJJJ. Therefore, this rule does not apply.

Prevention of Significant Deterioration of Air Quality (PSD)

The federal PSD program applies to major new sources and significant modifications to major existing sources located in attainment areas. The Department has adopted the federal PSD regulations in their entirety and codified them in Chapter 127, Subchapter D of 25 PA Code. The attainment status for Lehigh County, in which the DTE facility will be located, is as follows:

Pollutant	Standard	Attainment Status
Ozone:		
- 2008 8-hour Standard	0.075 ppm	Nonattainment
- 1997 8-hour Standard	0.08 ppm	Maintenance (attainment)
Particulate Matter ($PM_{2.5}$):		
- 2006 24-hour Standard	35 $\mu g/m^3$	Nonattainment
- 2006 Annual Standard	15 $\mu g/m^3$	Nonattainment
Sulfur Dioxide:		
- 2010 1-hour Standard	0.075ppm (75 ppb)	Pending designation
- 1971 Annual Primary Standard	0.03 ppm	Attainment[a]
- 1971 24-hour Primary Standard	0.14 ppm	Attainment[a]
Carbon Monoxide:		
1971 8-hour Standard	9 ppm	Attainment
1971 1-hour Standard	35 ppm	Attainment
Nitrogen Dioxide:		
- 2010 1-hour NO_2 Standard	0.10 ppm (100 ppb)	Attainment
- 2010 Annual Primary and Secondary Standard	0.053 ppm	Attainment
Lead:		
- 2008 3-Month Rolling Average	0.15 $\mu g/m^3$	Attainment

[a] Standard will be revoked in favor of the 2010 1-hour standard.

We have conducted the applicability analysis of the PSD regulations by calculating the projected actual emission rates of attainment pollutants (SO_2, NO_2, CO, lead, and CO_2) and comparing them to the major source thresholds. These calculations are presented in Attachment 3 and are summarized in the table below, which shows that the emission increases are less than the PSD major source thresholds. Therefore, the PSD requirements are not triggered.

Pollutant	Projected Actual Emissions (tpy)	Significant Emission Rate (tpy)
SO_2	4.0	250
NO_2	5.0	250
CO	13.4	250
Lead	3.6×10^{-6}	250
CO_2	62,907	75,000

Nonattainment New Source Review (NNSR)

The NNSR regulations apply in nonattainment areas - areas that are not meeting the National Ambient Air Quality Standards (NAAQS) for one or more air contaminants. The purpose of the NNSR regulations is to allow for industrial and economic growth in nonattainment areas while progressing toward the attainment of NAAQS.

Pennsylvania's NNSR permitting program is different from the federal program. Pennsylvania's NNSR rules are set forth in 25 Pa. Code, Chapter 127, Subchapter E. These regulations apply to (i) major new sources and (ii) major modifications at major existing sources, of nonattainment pollutants, which for the DTE site are ozone (regulated by the precursors, NO_x and VOC) and $PM_{2.5}$. The potential emissions of these pollutants and their respective major source thresholds are shown in the following table.

Pollutant	Potential Emissions, tpy	Major Source Threshold, tpy	Major?
NO_x	5.0	100	No
VOC	4.0	50	No
$PM_{2.5}$	1.5	100	No

Since the facility will not be a major new source for any nonattainment pollutant, the NNSR regulations do not apply.

Mandatory Greenhouse Gas Reporting Rule

On October 30, 2009, EPA promulgated the final greenhouse gas (GHG) reporting rule (40 CFR Part 98). The DTE facility is classified under Subpart C, General Stationary Fuel Combustion Sources. Under this Subpart, facilities meeting both of the following conditions are required to submit annual reports of CO_2, N_2O, and CH_4 emissions to EPA:

- Rated heat input to all stationary fuel combustion equipment (including boilers and thermal oxidizers, but not emergency equipment), exceeds 30 MMBTU/hour; and
- Actual GHG emissions exceed 25,000 metric tons per year, as CO_2 equivalent.

The rated heat input of the CCC unit (76.28 MMBTU/hr) exceeds 30 MMBTU/hr. Once the facility is in operation, DTE will calculate the annual GHG emissions for each calendar year. If they exceed the threshold of 25,000 metric tons per year, DTE will submit the required GHG report to EPA by March 31 of the following year.

Greenhouse Gas Tailoring Rule

On June 3, 2010, EPA promulgated its final rule addressing the applicability criteria of greenhouse gas (GHG) emissions and major air quality operating permit programs. EPA is tailoring the applicability criteria of the Prevention of Significant Deterioration (PSD) and Title V Operating Permit programs to avoid applicability of these complex programs to relatively small GHG emission sources. Without this rule, facilities that emit GHG at levels as low as 100 tons per year (tpy) would otherwise be subject to these programs that are intended for major emission sources. Industry as well as regulatory agencies would be overwhelmed by the additional permitting requirements. The Greenhouse Gas Tailoring Rule does not apply to this plan approval application since it is neither a PSD nor a Title V permit application.

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION REGULATIONS

Pennsylvania's air quality regulations are contained in PA Title 25, Article III, the Rules and Regulations of the Department of Environmental Protection (Department). The key sections of the Department's regulations with potential applicability to this project are summarized below.

Chapter 122 - New Source Performance Standards

Chapter 122 adopts the federal New Source Performance Standards. As indicated above, this application is not subject to any NSPS regulations.

Section 123.1 - Prohibition of Certain Fugitive Emissions

This regulation imposes a general ban on fugitive emissions, except for the following activities: clearing of land; construction and demolition; grading, paving and maintenance of roads and streets; use of roads and streets; and stockpiling of materials. Where these exempt activities are conducted, the facility must implement one or more of the following measures to minimize fugitive emissions:

1. Use, where possible, of water or chemicals for control of dust in the demolition of buildings or structures, construction operations, the grading of roads or the clearing of land.
2. Application of asphalt, oil, water or suitable chemicals on dirt roads, material stockpiles and other surfaces which may give rise to airborne dusts.
3. Paving and maintenance of roadways.
4. Prompt removal of earth or other material from paved streets onto which earth or other material has been transported by trucking or earth moving equipment, erosion by water, or other means.

DTE will implements these measures, as necessary, to minimize fugitive emissions. In addition, the feedstock shredder will be located indoors, which will minimize fugitive emissions from that source. DTE will install air curtains the overhead doors serving the incoming delivery trucks.

Section 123.2 - Fugitive Particulate Matter

This section prohibits fugitive particulate emissions in such a manner that they are visible beyond the facility property line. DTE will pave the haul roads on the site. The MSW and sewage sludge will be staged indoors and the building will be maintained under negative pressure. Therefore, visible fugitive emissions beyond the facility's property line are not expected.

Section 123.11 Particulate Emissions - Combustion Units

For combustion units with rated heat input between 2.5 and 50 MMBTU/hr, allowable particulate emissions are 0.4 lb/MMBTU. As shown in Attachment 3, particulate emissions will be 0.0051 lb/MMBTU, complying with this limit.

Section 123.22(c)(1) - Sulfur Compound Emissions -- Combustion Units

Emissions of sulfur oxides, expressed as SO_2, may not exceed 3 lb/MMBTU in any 1-hour period. As shown in Attachment 3, SO_2 emissions will be 0.025 lb/MMBTU, meeting this limit.

Section 123.31 - Odor Emissions

Emissions of malodorous air contaminants into the outdoor atmosphere such that the malodors are detectable outside the property line are prohibited. The facility will receive feedstock and store it indoors and the building will be maintained under negative pressure DTE will install air curtains the overhead doors serving the incoming delivery trucks. In view of the high combustion temperature and the operation of multiple emission control devices, odors detectable beyond the property line are not expected.

Section 123.41 - Visible Emissions

Emissions may not equal or exceed 20 percent opacity for more than three minutes in any hour, and may not equal or exceed 60 percent opacity at any time. Because of the high combustion efficiency and the emission control systems, visible emissions are expected to remain within these limits.

Section 123.51 - Nitrogen Compound Emissions

This regulation applies to combustion units with rated heat input greater than 250 MMBTU/hr. The CCC has a rated heat input of 76.28 MMBTU/hr. Therefore, this rule does not apply.

Chapter 124 - Hazardous Air Pollutants

Chapter 124 adopts the National Emission Standards for Hazardous Air Pollutants codified at 40 CFR Part 61. As indicated above, the facility is not subject to these standards.

Chapter 127, Subchapter B - Plan Approval Requirements

Section 127.11 prohibits facility owners from constructing new air pollution sources or air cleaning devices without first receiving plan approval and an operating permit from the Department. Section 127.12a requires that a compliance review form be submitted with the application or on a periodic basis as authorized in the section. The plan approval application submitted herewith demonstrates DTE's compliance with this requirement. As indicated above, DTE believes that construction of the facility may commence based upon the RFD issued in 2010.

Section 127.35 - Maximum Achievable Control Technology Standards for Hazardous Air Pollutants

This section adopts the MACT Standards codified at 40 CFR Part 63. As indicated above, the facility is not subject to these standards.

Section 127.43a - Public Notification

Applicants for plan approval are required to notify the municipality and county in which the facility will be located that such application is being made. Copies of the notifications to the Lehigh Valley Planning Commission and the City of Allentown and their associated proofs of delivery are included in Attachment 5.

Chapter 127, Subchapter E - New Source Review

Major modifications to major existing sources and major new sources located in nonattainment areas are required to incorporate Lowest Achievable Emission Rate (LAER) control technology and offset the new emissions. As indicated above, the proposed project will not trigger the NSR requirements.

Section 129.57 – Storage Tanks less than or equal to 40,000-gallon capacity containing VOCs

The provisions of this section apply to stationary aboveground storage tanks (ASTs) with a capacity greater than or equal to 2,000 gallons and less than or equal to 40,000 gallons, which contain VOCs with a vapor pressure less than 1.5 psig under actual storage conditions. Since the urea solution associated with the SCR system is not a VOC, this regulation does not apply.

Sections 129.91 to 129.95 - Stationary Sources of NO_x and VOCs

These sections implement the Department's Reasonably Available Control Technology (RACT) requirements; they apply to major NO_x- and VOC-emitting facilities for which no RACT requirements are specified elsewhere in Chapter 129. The DTE facility will not be a major NO_x- or VOC-emitting facility.

Section 135.3 - Emission Reporting

This regulation requires facilities that have been previously notified by the Department to submit source reports by March 1 of each year for the previous calendar year. DTE will submit annual reports if requested by the Department.

Section 135.21 - Emission Statements

Sources located in ozone nonattainment areas and emitting VOCs or NO_x must submit annual emission statements by March 1 of each year, reporting emissions of those air contaminants for the previous year. DTE will be located in an ozone nonattainment area and will submit annual emission statements beginning in the year following startup of the facility.

Section 137.4 - Air Pollution Episode Plans

Certain sources designated by the Department must submit a standby plan to be implemented in case of an air pollution episode. DTE will submit an episode plan if requested by the Department.

BEST AVAILABLE TECHNOLOGY ANALYSIS

The energy production facility will emit PM, NO_x, SO_2, CO, HCl, HF, VOC and metals. The RRS process technology pretreats the feedstock under high pressure and high temperature to produce a clean pulverized fuel for combustion in the CCC unit.

The effectiveness of various pollutant-specific technologies is discussed below.

PM and Metals

There are several potentially applicable PM control technologies, including cyclones, high-energy venturi scrubbers, fabric filters and electrostatic precipitators (ESPs). Cyclones are only 75 to 80 percent effective on large particles, and basically ineffective in removing submicron particles and metal fumes. The effectiveness of high-energy venturis is highly dependent on particle size, but can achieve removal efficiencies approaching 95 percent. Venturi scrubbers generate a by-product wastewater stream requiring treatment. ESPs are effective in removing submicron particles but their performance depends on particle resistivity, which in the case of the DTE facility, is unknown. ESPs are less efficient on particles smaller than 0.3 microns. In view of these factors, DTE believes that a cyclone in conjunction with fabric filtration is the optimal technology for removing PM and metals. They both represent reliable and proven technology, and have been used in applications similar to the DTE project.

NO_x

NO_x is a pollutant of primary concern because the Allentown area is part of the Interstate Ozone transport Region, which is regulated as a moderate nonattainment area. There are several candidate control technologies for NOx removal, including flue gas recirculation (FGR), selective catalytic reduction (SCR), selective non-catalytic reduction (SNCR), and combustion controls. SNCR is based on a gas-phase homogeneous reduction reaction between ammonia-containing solution and NO_x in the exhaust gas stream in the optimal temperature range between 1,800 and 2,100 °F. In an SNCR system, urea solution is injected into the combustion chamber

where NO_x is converted to N_2. SNCR systems are generally about 50 percent effective, given the limited residence time. DTE is proposing an SCR system, in which urea solution is used as a reducing agent to convert the NO_x to N_2. In an SCR system, the gas stream is heated to initiate the reaction in the catalyst bed. A temperature range of 550 to 900 °F is optimal -- below 540 °F, ammonium nitrate is formed, which can plug the catalyst; above 900 °F, the ammonia is converted to NO_x, further increasing NO_x emissions. SCR achieves NOx removal efficiencies above 85 percent. Therefore, DTE believes that the proposed combination of FGR and SCR represents BAT for this application.

Acid Gases

Acid gases including SO_2, HCl, and HF will be emitted by the DTE facility. These acid gases can be removed using wither dry or wet technology. In a dry scrubber (absorber), hydrated lime or sodium bicarbonate is injected into the gas stream where the acid gases react with the reagent, forming salts that are subsequently removed by a downstream fabric filter. Removal efficiencies of dry scrubbing systems are on the order of 85 percent. Wet scrubbing systems use alkaline solutions to absorb acid gases. Wet scrubbers can be tray type or packed columns. Tray scrubbers are more suitable for particulate applications because they minimize plugging. Packed columns are more efficient for controlling acid gases. In the case of the DTE facility, since the PM has been removed in the upstream cyclone and fabric filter, a packed column will be more effective. A 20% caustic solution will be used to maintain the pH between 6 to 7.5 to remove the acid gases. Blow-down from the packed column will be treated in the on-site wastewater treatment plant. The acid gas removal efficiency of wet scrubbing technology is more than 85 percent; hence, the packed column satisfies the Department's BAT requirement.

VOC

There are a number of technologies for VOC control -- thermal oxidation, carbon adsorption, and catalytic oxidation. Thermal and catalytic oxidation systems are not effective in controlling VOCs at low inlet concentrations as it also increases the emissions of NOx, CO, and other combustion byproducts. Carbon adsorption, on the other hand, is highly effective in removing low-concentration VOCs. It will also remove mercury, which exists in the vapor phase in the gas stream.

BAT

The proposed BAT controls are:

Pollutant	BAT Control
NO_x	Combustion controls, flue gas recirculation, and SCR with ammonia injection
Acid gases (SO_2, HCl, & HF)	Wet scrubber – Packed tower
VOC	Combustion controls and activated carbon system
PM10 & Metals	Cyclone and fabric filter
CO	Combustion controls
Mercury	Activated carbon bed system

PENNSYLVANIA HISTORICAL AND MUSEUM COMMISSION

Construction of the facility will disturb more than one acre of earth. Therefore, DTE is required to notify the Pennsylvania Historical and Museum Commission concerning this project. A notification to the Commission was submitted in 2010; the Commission indicated no interest in the project site.